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Probabilistic Analysis of English Dative Constructions in Academic Writings of English EFL Learners

Abstract

Grammatical patterns in learner writings are among the most investigated topics in second/foreign language acquisition, gaining particular momentum thanks to corpus studies. English dative constructions are among those for which comprehensive literature is also available, consisting of different perspectives to explain the linguistic phenomenon on various theoretical grounds. However, except for rare instances, the foci of interest have constantly been on comparing learner data to native speaker data, particularly in terms of frequency of use in the second/foreign language learning environment. Different from other studies, the current study investigated English dative alternation in learner data with a probabilistic point of view, scrutinizing 27 learner corpora of learners with different L1s. Results showed that differences in learners' native languages had little added value to variations among learners. Moreover, a tendency similar to priming the verb 'give' in dative constructions was observed for the other variables in the construction.

Keywords: English dative constructions, learner corpora, interlanguage, Bayesian regression, first language influence

English ditransitive constructions have been extensively studied as grammatical patterns in the syntax-semantic interface. Initially, generative or conventional approaches proposed prepositional object constructions (henceforth PD) as the base form, over which transformation rules are applied to form double object constructions (henceforth DO). In this view, both variants refer to the same semantic space, and shifts in patterns are due to different argument realizations required by the verbal object. On the other hand, contemporary theories propose that two distinct forms address two separate yet related meanings. In constructional accounts, ditransitive constructions are formed around the

canonical sense, that is, "agent argument acts to cause a transfer of an object to recipients" (Goldberg, 1995, p. 32), and verb-specific variations are realized in polysemic extensions of related senses. Additionally, despite certain verbs' saliency to prototypical sense, such a case is attributed not solely to verbal semantics or verb-oriented arguments but also certain constraints imposed by the constructional mapping of the "construal" (Langacker, 1987).

Early accounts of constructional analysis of English ditransitive emphasized the verb sensitivity approach, in which verbs included in different semantic classes are viewed as influential over the alternation preferences of English native speakers. Further proposing that certain verbs are more frequently preferred in one or the other variant, although the exact meaning is possible with any variant of choice with any verb as long as it permits ditransitive construction (Wasow, 2002; Arnold et al., 2003; Bresnan & Nikitina, 2008). Likewise, it is emphasized that the verb has the prominent position of influencing syntactic patterning of the constructions; for instance, the verb 'give' is commonly realized with animate recipients and concrete theme arguments in describing the transfer of possession sense.

In line with the constructional account of dative alternations, studies acknowledged that constructional choices vary due to factors including contextual variables, demographics of speakers, additional sociolinguistic factors, and metalinguistic influences with varying degrees of significance in different situations. For instance, Bresnan et al. (2004) observed additional constraints in spoken data, which are also imposed by characteristics of other arguments in a sentence, such as discourse accessibility, relative length, pronominally, definiteness and animacy. Similarly, Jenset et al. (2018) scrutinized the Spoken BNC2014 corpus investigating English dative alternation via multivariate models considering additional sociolinguistic factors. Results indicated that with a focus on sociolinguistics factors, "a graduate or postgraduate qualification lean towards a PD recipient, as does male gender, albeit with a smaller effect" (Jenset et al., 2018, p. 23). Also, Szmrecsanyi et al. (2017) investigated dative alternation among four varieties of spoken English, namely American English (AmE), British English (BrE), Canadian English (CanE), and New Zealand English (NZE), and observed how different groups of speakers would use the same constructions in varying forms.

The study of dative verbs and alternations is not uncommon in the second language acquisition/learning environment. Different approaches have attempted to explain the dative phenomenon from learners' perspective, investigating learners' preferences, acquisition order, awareness of verb sensitivity, or grammatical correctness of learner constructions. For instance, Le Compagnon (1984) reported French EFL learners' common preference for prepositional constructions. Similarly, Mazurkewich (1984) also revealed a similar pattern for French and Inuit EFL learners, further proposing that prepositional datives are acquired

first. In contrast, Tanaka (1987) applied acceptability judgment and translation tasks to Japanese EFL learners, focusing on the verb 'give' in different contexts. The results highlighted that both variants were equally frequent in learner outputs. More recently, Chang (2004) argued that intermediate-level Chinese EFL learners strongly prefer prepositional dative, and discourse or information flow (given vs new) has a limited influence on learners' choices. Finally, Marefat (2005) explained that advanced and high-intermediate Persian EFL learners are aware of information flow in the discourse and sensitive to discourse factors resulting in native-like constructions of learners. Wolk et al. (2011) also explored the verb sensitivity awareness of French EFL learners with different proficiency levels. They observed that intermediate-level students favoured prepositional object dative, while advanced learners used two variants in almost similar frequencies, indicating advanced learners' better knowledge of current constructional rules and a higher awareness of verb sensitivity. Similar findings were also noted in other studies; for instance, beginner-level Russian EFL learners (De Cuypere et al., 2014) and German EFL learners (Führer, 2009) commonly preferred prepositional object datives more than double object ones. Lastly, Zeybek (2018) also acknowledged a higher prepositional object dative frequency than double object variants in Turkish EFL learners' data.

Other studies investigating the same phenomena utilized corpus analysis and multifactorial statistics. For instance, Callies and Szczesniak (2008) studied fifteen verbs frequently used in English dative constructions over German and Polish learners' subcorpora of ICLE, comparing results to British and American university students' subcorpora of LOCNESS. They noted that learners are aware of verb bias, information structure, and syntactic weight of post-verbal arguments, and regarding verb-construction pair choices, learners preferred certain verbs in either variant resembling similarities to native speakers. Similarly, Song and Sung (2017) analyzed the Korean EFL learners' corpus and compared the results to the native speaker corpus investigating fifteen frequent alternating verbs previously cited in Callies and Szczesniak (2008) and observed that Korean EFL learners favoured prepositional datives significantly more than native speakers. Finally, Babanoğlu (2007, 2011) scrutinized the Turkish subcorpus of ICLE, and on par with the studies mentioned above, she acknowledged a higher prepositional object dative frequency compared to native speakers of English.

The most comprehensive of all is Jäschke (2016), which examined 16 learner corpora, each representing one of 16 different native languages of learners and a corpus of English native speakers. The study reported that all learners included in the study successfully acquired both prepositional and double object variants and followed the pattern for post-verbal arguments as predicted by the harmonic alignment pattern (Bresnan & Ford, 2010). However, the length difference was the most prominent factor in predicting learner constructions,

and learners used more PD constructions in their writings than native speakers. Similarly, the current study also investigated the dative constructions in learner corpus, with a focus on influential lexical arguments in priming two different alternations, namely double object constructions and prepositional constructions.

As clearly inferred from the studies mentioned above, foci of interest have frequently been on the contextual and linguistic factors proposed to be influential on variant preferences. Besides, few studies in second/foreign language dative alternation explicitly addressed the role of the interaction between the learners' first language and the target language as a possible factor controlling construction preference. Firstly, Whong-Barr and Schwartz (2002) investigated datives in child first language acquisition and examined if L1 grammar properties would be transferred to L2 grammar. In the study, Japanese L1 speaker children accepted all dative structures as grammatically correct, although some were ungrammatical. Meanwhile, in the same study, children with Korean L1 could successfully distinguish grammatically correct structures from ungrammatical ones. Therefore, the authors suggested that Japanese children overgeneralized rules from their first language to English. In another study, Al-jadani (2018) also strongly emphasized L1 influence over L2 constructions, particularly in the context of Arabic EFL learners, and stated that Arabic learners failed to acquire the double object dative variant since the corresponding structure does not exist in Arabic.

Apart from those, many studies indirectly or implicitly addressed and discussed the role of first language as a likely influencing factor. For instance, Babanoğlu (2011) noted no significant difference among proficiency levels; however, there were patterns of over- and underuse compared to native speakers, which she concluded was due to L1 transfer. Kang (2011) and Song and Sung (2017) also concluded a similar discussion with an emphasis on cross-linguistic influences, as Korean does not have an equivalent structure for English ditransitive dative. Finally, Jäschke (2016) also concluded that learners whose first languages have a similar structural organization of dative constructions and corresponding structures tend to represent a more nativelikeness in English dative use.

However, one major problem with the studies cited above is that the analyses encompassed only a selected set of verbs proposed to be frequent in English dative constructions. Consequently, a common finding has been the frequent use of prepositional dative by non-native speakers compared to English native speakers. Nonetheless, given the hypothesis of lexical bias or verb saliency, it would have been more plausible if these studies had reported findings as the observed dominant use of prepositional object construction for selected verbs only. Moreover, since each verb and additional argument are likely to impose individual constraints for different variants, reliance on the analysis of only a set of selected verbs may lead to incorrect overgeneralization. Lastly, although

many studies, except for Jäschke (2016), included one group of students who share the same first language, findings were discussed mainly around the first language influence without any empirical data.

Therefore, following the framework provided by previous studies, yet with a different methodology, this study analyzed English datives with a top-down approach, from constructions to verbs and other variables. Accordingly, the dative phenomenon was investigated not through a set of selected verbs but via a constructional perspective. In doing so, learner corpora of students with different first languages were compared to evaluate the degree of variation among them and to reveal the common patterns of dative constructions. Therefore, the study aimed to investigate the probabilities of observing two English alternating dative constructions and compare these probabilities along with significance values across corpora. Additionally, it assessed the weight of influential factors, including pronominality and classification of agents, recipients, and themes as human vs. nonhuman, in addition to the length in characters of these items.

Method

Corpus Data

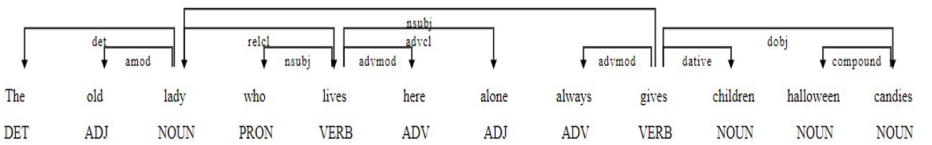
The study scrutinized ICLE version 3 (International Corpus of Learner Language) (Granger et al., 2020), a collection of essays written by learners from twenty-six different native languages on various topics. As of version 3, the corpus consists of "9,529 essays for a total number of 5,766,522 words distributed over twenty-five national subcorpora" (Granger et al., 2020, p. 33). Learners are young adults and university undergraduates with an average age range between 20 and 23 years old. Additionally, proficiency levels based on the Common European Framework (Council of Europe, 2001) vary from B1 as the lowest to C2 as the highest (Granger et al., 2020, p. 11). Approximately "61% of the sample essays were rated as advanced (C1 or C2), even reaching 100% in the case of Swedish, but can be as low as 5 or 10% in others" (Granger et al., 2020, p. 11). Therefore, there is no uniform distribution of proficiency levels across the corpus. Most texts included in the corpus are categorized as argumentative essays, while a small proportion corresponds to literary texts. Finally, there are thirty-two distinct native languages included in the corpus. However, due to their small size, Albanian, Bosnian, Arabic, Aromanian, Chinese-Mandarin, and the ones tagged as Others were not included in the analysis.

Corpus Annotation and Dependency Parsing

Dative constructions were revealed through dependency parsing, which is the context-dependent analysis of sentence segmentation based on a sentence's grammatical and lexical structure. To specify, in dependency parsing, "the syntactic structure of a sentence is described solely in terms of the words (or lemmas) in a sentence and an associated set of directed binary grammatical relations that hold among the words' and "the head-dependent relationship is made explicit by directly linking heads to the words that are immediately dependent on them, bypassing the need for constituent structures" (Jurafsky & Martin, 2021, p. 1). Figure 1 shows an example of dependency parsing output for a dative sentence.

Figure 1

Dependency Parsing for Sample Dative Sentence



In Figure 1, the sentence was processed in two sets; clausal relations and modifier relations, as the headword (predicate or root), is a verb 'give' around which intra-sentence relationships are built, and syntactic roles are described, the word 'children' is the dative (DATIVE), and 'candies' is the direct object (DOBJ). Also, the subject of the sentence is segmented further, the noun 'lady' as the subject (NSUBJ) and who lives alone as the relative clause (RELCL), and the old as an adjectival modifier (AMOD) with a determiner (DET).[1]

The corpus was parsed, pos-tagged, and scrutinized in Python programming language via the natural language package Spacy version 3.2 (Honnibal, Matthew and Montani, Ines and Van Landeghem, Sofie and Boyd, Adriane, 2020). The statistical dependency parsing model of the Spacy package has a claimed 100% tokenization and 94% dependency parsing accuracy.[2] For the study, two dependency patterns expressing prepositional object dative—(Subject—Predicate—Indirect Object—Preposition—Prepositional Object) and double object dative (Subject—Predicate—Direct Object—Indirect Object) constructions were defined, and corresponding sentences were extracted from the corpus via Python programming language. Next, extracted sentences were

[1] A detailed list of Dependency Labels can be found at https://github.com/clir/clearnlp-guidelines/blob/master/md/specifications/dependency_labels.md

[2] See https://spacy.io/models/en for more detailed accuracy evaluation.

segmented into the constituents, and subjects (Agent) and objects (Theme and Recipient) were tagged for pronominality and nonpronominality. Finally, lexical items were manually tagged for the humanness of referential entities as human (including collective nouns referring to humans) or nonhuman (animals and inanimate objects, including mass nouns). However, a note of caution is required for the variable consisting of referential entity classification, which is commonly termed as animacy in many studies. As indicated in many studies (Lakoff, 1987; Myhill, 1992; Yamamoto, 1999; Vihman, 2019), the concept of animacy is a linear scale extending from humans through animals to inanimate objects rather than a binary category of animate vs. inanimate. Also, in English, the animacy feature of animals is not clearly defined since some animals are conceptualized as more human-like (Leach, 1964) and therefore included in animates, while others are positioned on the other end of the animacy hierarchy scale and included among inanimates. Likewise, English codifies animals with the inanimate pronoun 'it' when singular. Regarding this, the referential status of subjects and objects was coded as human vs. nonhuman in the current study to avoid terminological confusion.

Dataset and Statistical Analysis

Following Bresnan et al. (2007), the datasets were segmented into ten explanatory variables: native language, part-of-speech, and tags for referential entities of agent, theme, recipient, length of themes and recipients, and semantic classes of verbs. The numeric variables including length of theme and recipient were presented as log-scaled to adhere to normality distribution. Different from other studies, the properties of agents were also provided to the model as probable predictors. Another difference is that previous studies included semantic classes of verbs as categorical variable. However, as will be evident in the related section, the dataset was skewed regarding verb frequency, as the verb 'give' was dominantly prevalent across each corpus in both constructions. Consequently, this variable was excluded in the current study from the regression analysis, as it would have also mislead the results conditioned on the verb and their semantic classes. Finally, to investigate variation across learner corpora, the ICLE corpus was divided into subcorpora, and learners' native languages were assigned as random effect variables considering the ICLE corpus structure, where each learner language represents an individual subcorpus.

- Native Language, factor with 27 levels: Chinese, Chinese-Cantonese, Hungarian, Tswana, Korean, Swedish, German, Greek, Persian, Portuguese, Bulgarian, Japanese, Italian, Serbian, Polish, Czech, Lithuanian, Russian, Norwegian, Finnish, Macedonian, Turkish, Spanish, French, Dutch, Punjabi, Urdu, other.

- Agent, Theme, and Recipient part-of-speech tags, a categorical variable with two levels: Pronominal and Nonpronominal.
- Agent, Theme, Recipient animacy, a categorical variable with two levels: Human, Nonhuman.
- Recipient and Theme length: log-transformed, integer-valued variable.
- Alternations: a categorical variable with two levels, Double Object Dative (DO), Prepositional Object Dative (PD).

Statistical analysis consisted of descriptive analysis and Bayesian Regression as the probabilistic model. The term Bayesian indicates a different approach to the statistical inference of results; for instance, rather than significance estimates or point estimates, it provides the probabilities of predictors' effects over the response in the available data. Therefore, correlation and relationship among variables are expressed in uncertainty values termed as posterior distribution.

Bayesian regression was applied via "rstanarm" package (Goodrich et al., 2020) for the R programing language, and outputs were analyzed further with the 'BayestestR' (Makowski et al., 2019) package. MCMC (Markov Chain Monte-Carlo) was utilized with Bernoulli likelihood for categorical outcomes on normal (weekly informed) priors as the sampling method. Considering posterior distributions, incidences of centrality were reported as median, while Highest Density Interval (HDI) stated the uncertainty with posterior characterization, and Credible Interval (CI) reported the range of percentage of probable values. Finally, the probability of effect existence was expressed in Probability of Direction (pd), and the significance of the effect was estimated via Region of Practical Equivalence (ROPE). For the study, two different regression models were prepared; as the first one focuses on the differences among subcorpora regarding differences in first languages only, excluding additional variables. Meanwhile, the second model consists of influential factors as fixed effects and learners' first languages as random effects variable, that is, variation of interest conditioned on the additional factors. In other words, the first model realized the probabilities of alternating constructions given the first language differences only, while the second model represented the probabilities conditioned on the additional factors assessing the weights of each variable.
Two different regression models are as follows;

1) Binomial Regression with Native Language (fixed) predictor only as conditioned on categorical outcomes (DO vs PD)
   Logistics Regression Model for Native Language as Predictor only: Alternation ~ – [3]1 + Native Language, family = binomial(link = 'logit'), init_r = 0.5, QR = TRUE, iter = 10000, prior_intercept = normal(2, 0.5), prior = normal(0, 2.5, autoscale = TRUE)

[3] –1 indicates no intercept was defined.

2) Binomial regression with additional variables as fixed effects and Native Language as random effect predictors
Logistic Regression Model for Additional Predictors with Native Language as Random Effect: Alternation ~ Agent POS + Agent Humanness + Theme POS + Theme Humanness + Theme Length + Recipient POS + Recipient Humanness + Recipient Length + (1 | Native Language), [4]family = binomial(link = 'logit'), init_r = 0.5, QR = TRUE, iter = 10000, prior_intercept = normal(2, 0.5), prior = normal(0, 2.5, autoscale = TRUE)

Statistical Analysis

Overall Dative Construction Use across Corpora

The initial analysis included descriptive statistics for constructions, their frequencies across each corpus, the number of documents each construction was observed in, the number of verb types and tokens, and their distribution over constructions in each subcorpus.

Table 1 represents the raw frequencies of each construction and their percentages in each learner subcorpus. Initially, there were observed a total of 4011 dative constructions in the whole corpus, of which 70% (n = 2808) were double object constructions, and 30% (n = 1203) were prepositional object dative. Additionally, the table shows the number of unique documents in which constructions were used. For instance, considering the whole ICLE corpus, all double object constructions were dispersed over a total of 2054 (73%) individual learner essays. In other terms, the structure was used at least once in roughly seven out of ten texts consisting of double object construction. Therefore, comparing percentages of unique documents for both constructions, although the overall instances of prepositional variants were significantly lower than double object ones', the total number of unique documents with the former construction was higher (n = 994, 82.62%). The results indicate that the repeated use of prepositional constructions by the same students was lower compared to the figure for double object constructions.

[4] Learners' native languages were set as random effects variable.

Table 1

Distribution of Dative Constructions Across Learner Subcorpora

	Alternation				
	Double Object		Prepositional Object		
Native Language	**N1**	**N2**	**N1**	**N2**	**NTotal**
Chinese-Cantonese	230 (61.82%)	172 (74.78%)	142 (38.17%)	117 (82.39%)	372
Japanese	134 (62.91%)	87 (64.92%)	79 (37.08%)	53 (67.08%)	213
Turkish	99 (47.82%)	74 (74.74%)	108 (52.17%)	80 (74.07%)	207
Russian	145 (76.31%)	103 (71.03%)	45 (23.68%)	41 (91.11%)	190
Swedish	147 (81.66%)	101 (68.70%)	33 (18.33%)	27 (81.81%)	180
Tswana	147 (81.66%)	111 (75.51%)	33 (18.33%)	33 (100%)	180
German	150 (85.22%)	111 (74%)	26 (14.77%)	26 (100%)	176
Greek	108 (62.79%)	80 (74.07%)	64 (37.20%)	57 (89.06%)	172
Serbian	132 (81.48%)	85 (64.39%)	30 (18.51%)	29 (96.66%)	162
Dutch	130 (81.76%)	81 (62.30%)	29 (18.23%)	24 (82.75%)	159
Norwegian	120 (76.43%)	93 (77.5%)	37 (23.56%)	30 (81.08%)	157
Punjabi	68 (49.27%)	46 (67.64%)	70 (50.72%)	46 (65.71%)	138
Korean	86 (64.66%)	58 (67.44%)	47 (35.33%)	40 (85.10%)	133
Macedonian	104 (79.38%)	78 (75%)	27 (20.61%)	22 (81.48%)	131
Czech	107 (82.30%)	73 (68.22%)	23 (17.69%)	19 (82.60%)	130
Italian	82 (63.07%)	68 (82.92%)	48 (36.92%)	41 (85.41%)	130
Persian	83 (64.34%)	69 (83.13%)	46 (35.65%)	36 (78.26%)	129
Bulgarian	93 (72.65%)	67 (72.04%)	35 (27.34%)	30 (85.71%)	128
Spanish	82 (67.21%)	58 (70.73%)	40 (32.78%)	36 (90%)	122
Polish	93 (76.85%)	71 (76.34%)	28 (23.14%)	24 (85.71%)	121
Portuguese	80 (66.66 %)	66 (82.5%)	40 (33.33%)	37 (92.5%)	120
French	84 (75%)	63 (75%)	28 (25%)	24 (85.71%)	112
Hungarian	75 (72.11%)	59 (78.66%)	29 (27.88%)	26 (89.65%)	104
Urdu	52 (54.73%)	34 (65.38%)	43 (45.26%)	28 (65.11%)	95
Chinese	65 (73.03%)	48 (73.84%)	24 (26.96%)	23 (95.83%)	89
Finnish	61 (75.30%)	54 (88.52%)	20 (24.69%)	19 (95%)	81
Lithuanian	51 (63.75%)	44 (86.27%)	29 (36.25%)	26 (89.65%)	80
Total	2808 (70.0%)	2054 (73.00%)	1203 (30%)	994 (82.62%)	4011

Legend: N1 shows the total raw frequency and the ratio of relevant variant to the sum of both constructions' frequency. N2 shows the number of unique documents and the ratio to the total frequency of the relevant construction.

Furthermore, regarding subcorpora individually, the highest rate of double object construction (85.22%) was observed in German learners' subcorpora when the figure was compared to that of prepositional construction in the same subcorpus (14.77%). On the other hand, the lowest rate of double object construction (47.82%) was observed in Turkish learners' subcorpus, followed by Punjabi learners' subcorpus (49.27%). Finally, the lowest number of unique documents of double object constructions was 62.30%, the lowest in Dutch learners' subcorpus, and the highest was 88.52% found in Finnish learners' subcorpus. To specify, the Finnish subcorpus had the lowest repetition rate by the same student as it had the highest ratio of unique documents for double object construction, while the Dutch learners' subcorpus presented the highest repetition rate. Meanwhile, in some cases, figures for prepositional construction dispersion were 100%, whereas the lowest ratio was observed in Urdu learners' subcorpus (65.11%), indicating a higher repetition rate by the same student.

Table 2

Logistic Regression with Native Language as Predictor Only

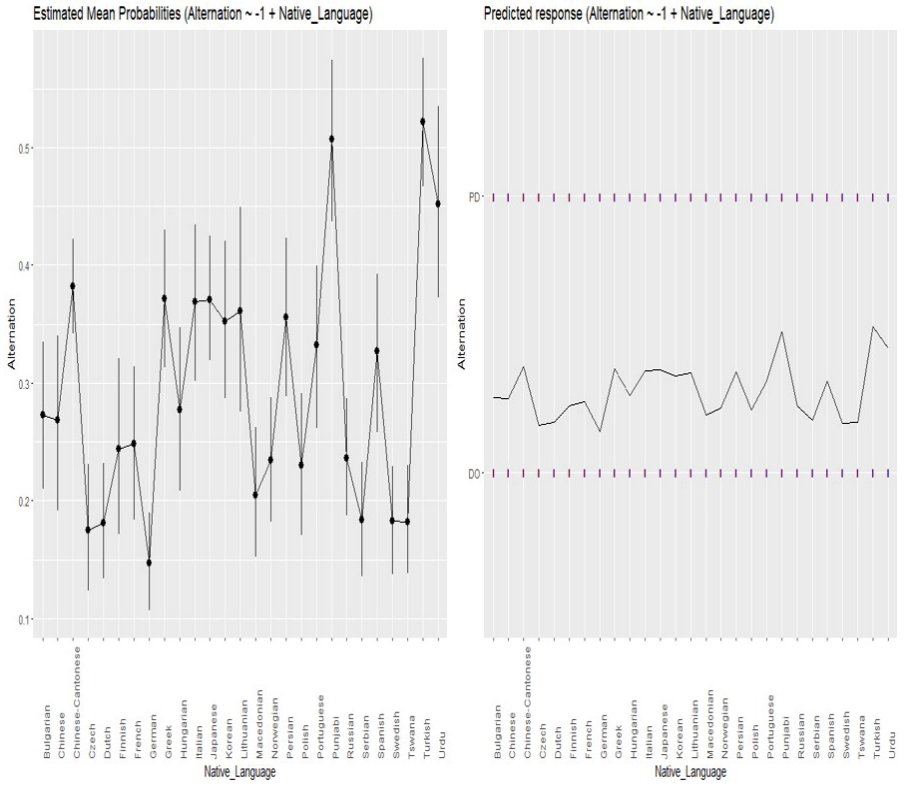
Parameters	Median	89% CI	pd	in ROPE %	BF
Bulgarian	–0.98	[–1.30, –0.68]	100%	0%	799.94
Chinese	–1.01	[–1.39, –0.62]	100%	0%	45.37
Chinese-Cantonese	–0.48	[–0.66, –0.31]	100%	0%	121.15
Czech	–1.55	[–1.93, –1.19]	100%	0%	> 1000
Dutch	–1.51	[–1.83, –1.18]	100%	0%	> 1000
Finnish	–1.13	[–1.55, –0.71]	100%	0%	178.95
French	–1.11	[–1.46, –0.76]	100%	0%	584.08
German	–1.76	[–2.11, –1.42]	100%	0%	> 1000
Greek	–0.52	[–0.77, –0.27]	100%	0%	4.96
Hungarian	–0.95	[–1.31, –0.62]	100%	0%	130.83
Italian	–0.54	[–0.83, –0.25]	100%	0%	1.23
Japanese	–0.53	[–0.75, –0.30]	100%	0%	19.82
Korean	–0.61	[–0.89, –0.32]	100%	0%	4.9
Lithuanian	–0.57	[–0.94, –0.19]	99%	3%	0.283
Macedonian	–1.36	[–1.70, –1.02]	100%	0%	> 1000
Norwegian	–1.18	[–1.49, –0.88]	100%	0%	> 1000
Persian	–0.59	[–0.88, –0.29]	100%	0%	2.84
Polish	–1.21	[–1.53, –0.85]	100%	0%	> 1000
Portuguese	–0.7	[–1.01, –0.39]	100%	0%	7.85
Punjabi	0.03	[–0.24,0.30]	57%	74%	0.013
Russian	–1.17	[–1.45, –0.91]	100%	0%	> 1000
Serbian	–1.49	[–1.82, –1.17]	100%	0%	> 1000
Spanish	–0.72	[–1.04, –0.42]	100%	0%	9.27
Swedish	–1.5	[–1.80, –1.19]	100%	0%	> 1000
Tswana	–1.5	[–1.82, –1.20]	100%	0%	> 1000
Turkish	0.09	[–0.14,0.31]	74%	75%	0.015
Urdu	–0.19	[–0.52,0.14]	82%	47%	0.019

Legend: Credible Interval as HDI Highest Density Interval, pd = Probability of Direction, ROPE = Region of Practical Equivalence, BF = Bayes Factor

Table 2 shows the results for the second regression model, including alternation types as responses and learners' native languages as fixed-effect predictors. Note that double object construction was assigned as the reference level. Therefore, negative coefficients for most subcorpora indicate priming of DO constructions with a 100% probability of effect existence (pd). Also, based on %ROPE values, the effect was statistically significant. Nonetheless, in two subcorpora, Turkish and Punjabi, the direction was towards PD constructions. Considering these subcorpora, the effect had a roughly 57% of probability (Median = 0.03, CI[–0.24, 0.30]) in Punjabi and %74 of probability (Median = 0.09, CI[–0.14, 0.31]) in Turkish subcorpus. However, in both cases, the effect was not significant. Figure 2 shows the probabilities of alternations and predicted responses for each subcorpus.

Figure 2

Estimated Means Probabilities and Predicted Alternations for each Subcorpus



To sum up, estimated probabilities of observing DO or PD constructions show that only two subcorpora, Punjabi and Turkish, have probability values

higher than threshold 0.5, revealing a higher likelihood of observing PD. On the other hand, the probability of observing DO constructions was the highest in German learners' subcorpus, followed by Czech learners' subcorpus. Despite variations in probabilities of observing two different types of dative constructions, the effect of differences in learners' first languages was not statistically significant.

Table 3

The Most Frequent Verbs in both Constructions in ICLE

Alternations					
Double Object			**Prepositional Object**		
Verb	*Freq in DO*	*Ratio to Total Freq*	**Verb**	*Freq in PD*	*Ratio*
Give	1485	52.9%	*Give*	633	52.6%
Offer	141	5.02%	*Bring*	106	8.81%
Show	134	4.77%	*Offer*	62	5.15%
Bring	123	4.38%	*Do*	54	4.49%
Tell	113	4.02%	*Pay*	52	4.32%
Teach	109	3.88%	*Send*	50	4.16%
Provide	95	3.38%	*Provide*	40	3.33%
Cost	73	2.60%	*Show*	29	2.41%
Ask	57	2.03%	*Sell*	21	1.75%
Take	48	1.71%	*Teach*	19	1.58%
Total	2378/2808	84.68%		1066/1203	88.61%

Legend: Freq in DO states the frequency of the verb in double object constructions, Freq in PD states frequency in the prepositional object. The ratio is the percentage of each verb to each construction.

Followingly, 147 different verbs in 4011 dative instances were observed. However, given the cut-off value of 10, this number dramatically dropped to 28 different verbs and even lower when verbs were organized into constructions. There were 126 different verbs in DO and 62 in PD constructions; however, the figures were 23 and 13 verbs, respectively, above the threshold value. Table 3 shows the top ten most frequent verbs per alternation and their percentages to the total verb frequency in each construction. Therefore, the most frequent top ten verbs accounted for approximately 85% (n = 2378) of all double object constructions and 89% (n = 1066) of all prepositional constructions, indicating a limited number of different verbs across the corpus. Likewise, the most common verb for both constructions was 'give', as it constituted more than 50% of each construction in the ICLE corpus individually and again almost 52% (n = 2118) of all the constructions in the corpus.

Table 4 shows raw frequencies and percentages of part-of-speech tags along with their animacy status of components, namely agent, theme, and

recipient in ICLE. In both constructions, slightly more than half of the agents were nonpronouns, involving common nouns and proper nouns, while 66% were nonhuman entities in the double object variant and 51% were human entities in prepositional object ones. Followingly, nonpronoun themes were equally common in both constructions, and approximately 98% of all themes in each case were nonhuman. However, there was a stark contrast in recipients as pronouns were more common in double object variants and nonpronouns in prepositional object ones. Finally, almost 90% of recipients were human entities in double object constructions; the figure for prepositional ones was 64%.

Table 4

The Distribution of Part-of-Speech and Animacy Tags in both Constructions

	Alternation							
	Double Object				Prepositional Object			
Part-of-Speech	Pron.	NonPron	Ani.	Inani.	Pron.	NonPron	Ani.	Inani.
Agent	1240 (44.2%)	1568 (55.8%)	952 (33.9%)	1856 (66.1%)	501 (41.6%)	702 (58.4%)	622 (51.7%)	581 (48.3%)
Theme	117 (4.17%)	2691 (%95.8)	63 (2.24%)	2745 (97.8%)	70 (5.82%)	1133 (94.2%)	24 (1.99%)	1179 (98.0%)
Recipient	1987 (70.8%)	821 (29.2%)	2512 (89.5%)	296 (10.5%)	192 (16.0%)	1011 (84.0%)	767 (63.8%)	463 (36.2%)

Legend: *Pron*. states pronominals, including demonstrative and subject pronouns. *NonPron.* states nonpronominals, including common nouns and proper nouns. *Ani*. stands for animate while *Inani.* for inanimate.

Estimating Weights of Influential Variables

The previous section detailed descriptive analysis of constructions with relative frequencies of verbs and other constituents. This section investigates the results of Binomial regression analysis to estimate individual factors' weights and the probabilities of observing varying alternations given the factors considered in the study.

Table 5

Summary of Posterior Distribution for Predictors in ICLE

Parameter	Median	89% CI	pd	% in ROPE	BF
Intercept	–1.0	[–1.70, –0.31]	99.03%	2.67%	0.274
Agent					
PosPRON	–0.25	[–0.39, –0.09]	99.54%	24.59%	0.505
Animacy(Inanimate)	–0.98	[–1.14, –0.82]	100%	0%	> 1000
Theme					
PosPRON	1.11	[0.78, 1.42]	100.00%	0%	> 1000
Animacy(Inanimate)	0.79	[0.29, 1.24]	99.68%	1.71%	0.703
Length	–0.67	[–1.04, –0.29]	99.75%	1.71%	1.03
Recipient	–1.9				
PosPRON	0	[–2.10, –1.70]	100%	0%	> 1000
Animacy(Inanimate)	0.74	[0.58, 0.91]	100%	0%	> 1000
Length	1.83	[1.40, 2.29]	100%	0%	> 1000

Legend: Credible Interval as HDI Highest Density Interval, pd = Probability of Direction, ROPE = Region of Practical Equivalence, BF = Bayesfactor

In Table 5, the summary for posterior distribution for the second regression model consisted of learners' native language as random effects and other variables as fixed effects. Initially, given all the factors kept constant, with a probability of 99.03%, (Median = –1.0, 89% CI[–1.70, –0.31]), the double object construction (reference level) was 0.36 exp(–1.0) more likely.

Figure 3

Possibilities of Predicted Response across each Subcorpus

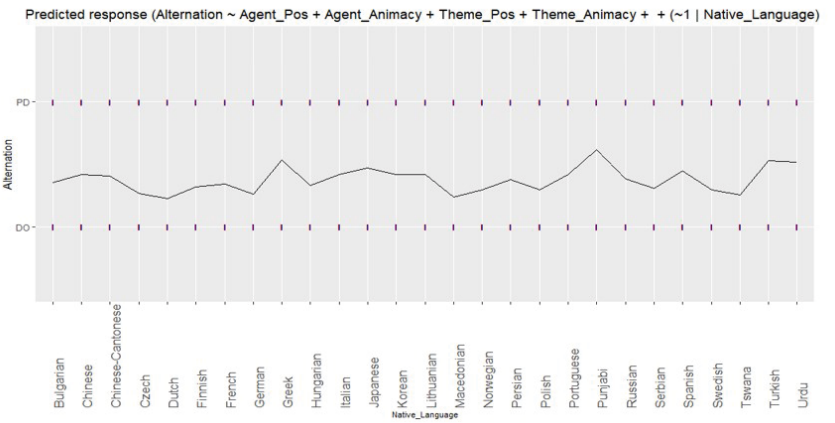


Figure 3 represents the probabilities of each alternation after conditioning the data for each reference level (human and pronominal agent, theme, recipient). It was noted that the probabilities of PD constructions were higher in Punjabi and Turkish subcorpora, followed by Greek learners' corpus. Also, in some cases, for instance, in Dutch, German, and Macedonian learners' corpora, probabilities favoured DO constructions. Nonetheless, as stated earlier in the interpretation of the previous regression model, the variation of probabilities of observing different constructions across all subcorpora was insignificant.

Considering influential items, pronominal agents with a probability of 99.54% (Median = –0.25, 89% CI[–0.39, -0.09]) and pronominal recipients with a probability of 100% (Median = –1.90, 89% CI [–2.10, –1.70]) were in favour of DO constructions. However, the significance of the effect was undecided for the agent (24.59% in ROPE). Similarly, in frequency analysis, pronominal agents shared similar ratios in both constructions. Next, the effect was significant for the pronominal recipients (0% in ROPE), and they were 0.14 exp(–1.90) more likely to be primed in DO than PD constructions. On the other hand, the effect of pronominal themes has a probability of 100% being positive (Median = 1.11, 89% CI[0.78, 1.42] and can be considered significant (%0 in ROPE). Therefore, pronominal themes were 3.04 times more likely to be observed in PD constructions, while nominal ones were more likely in DO. The following excerpts are from learner corpora,[5] and words/phrases in bold are examples of themes and recipients with more weight.

1) Several events have been showing **us this will to** cross frontiers. (Finnish – FIJY1049)
2) This Church provides **them the rest** in their heads (Czech – CZUN1018)
3) Firstly, First National Bank offers **you many opotunitties** and you can find it everywhere you and you can get it anytime you want. (Tswana – TSNO1399)
4) As a mother God has assigned **her a different role** to perform. (Punjabi – PACJ1004)
5) … the most common for the human kind is that we all usually don't give a **chance to someone**… (Serbian – SWUL4001)
6) He has a family and it is the right of his family that he also give **time to them**. (Urdu – PACJ1015)
7) …but by doing so we hardly do **justice to him** or her as we simply cannot bring them back to life. (Polish – POPZ4035)
8) It's a sort of bliss for Cam and James: at that moment they feel that their father could ask **them anything** they would do it. (French – FRUC1030)

[5] The first line in brackets represents learner's first language and second line shows ICLE specific document id of the essay the sentence was extracted. Also note that errors in the learners' sentences were not corrected when sampling.

9) Second level, now we should tell **them useful English**. (Japanese JPKO2014)
10) However much applause these actors were given they owe **their success** to **William Shakespeare**. (Swedish – SWUL7050)
11) Later we have no sure that the judges will give **us justic**. (Punjabi – PAGF1066)
12) They can see that their work is providing **the society something good**, and this might relieve them from their feeling of alienation. (Norwegian – NOOS1045)

Considering the animacy status of variables, only nonhuman agents had more weight in DO variants, as the effect was significant (0% in ROPE) and had a probability of 100% of being negative (Median = –0.98, 89% CI[–1.14, –0.82]). Nonetheless, both nonhuman themes and nonhuman recipients significantly favoured PD constructions with a probability of 100% in both cases (Median = 0.79, 89% CI[0.29, 1.24]; 0.74, 89% CI[0.58, 0.91], respectively). The results indicate that nonhuman themes were 2.20 more likely in PD variants, whereas nonhuman recipients were 2.09 more probable in the same construction. The followings are sentences from learner corpora,[6] and words/phrases in bold present nonhuman agents.

13) **Modern means of transportation** give us the chance to travel widely, labour-saving devices make life easier and more enjoyable. (Bulgarian – BGSU1025)
14) Seriously, **television** gives us not only an amusement, but also good pieces of information. (Chinese – CNUK3052)
15) Secondly, **university degrees** not only bring people some important knowledge, but also can affect people's future. (Czech – CZPR3044)
16) Theoretically, **capitalism** gives people this freedom to choose. (Dutch – DBAN1004)
17) Because **it** will bring me money that will enable me to travel and do all the things I've dreamt of. (Finnish – FIHE1016)
18) **Our consumer society** offers us everyday more and more available products of all kinds: not only the necessities as food, clothes ... but also the superfluity as videos, freezers, micro-wave oven, televisions, etc... (French – FRUC2024)
19) **Cyber cafes** provide them a opptunity to use internet, they only pay little money to use computer in Cyber cafes. (German – GEAU2031)
20) First of all, **the competition** at the job market does not allow one the luxury of not having a mobile. (Hungarian – HUEL3075)

[6] The first line in brackets represents learner's first language and second line shows ICLE specific document id of the essay the sentence was extracted. Also note that errors in the learners' sentences were not corrected when sampling.

21) In conclusion, **the nature** sends us obvious warning messages by giving rise to these phenomena. (Japanese – JPTM1025)

Lastly, assessing the length of themes and recipients, results showed that while longer recipients were more likely in PD constructions, the opposite occurred for theme length: the longer the themes, the more likely they are to be observed in DO constructions. The effect of theme length has a probability of 99.75% of being negative (Median = –0.67, 89% CI[–1.04, –0.29]) and the effect of recipient length has a probability of 100% of being positive (Median = 1.83, 89% CI[1.40, 2.29]). Also, %ROPE values indicate that the effect can be considered significant in both cases.

Discussion and Conclusion

This study investigated the English dative constructions in learner corpora with a focus on likely influential factors for patterning two different constructions, double object and prepositional one. After revealing the frequencies of constructions, verbs along with pronominality and humanness status of agents, themes and recipients, two different regression models were applied to observe probabilities of constructions. The first model focused on only the differences among learners' native languages regardless of additional factors, while the second model included additional factors and learners' first languages. Therefore, the study aimed to analyze if learners' first language or other factors have any weight in preference for any variants.

The results revealed that the differences in learners' first languages had no added value in priming a particular variant over the other. Despite varying probabilities of two different dative constructions, differences were not statistically credible, and only in two subcorpora, namely Punjabi and Turkish, the probability of observing PD construction was higher. A similar phenomenon was also observed in verb choices, as the verb 'give' was dominantly more frequent across the whole corpus in both variant types. Moreover, the top ten verbs commonly occurred in both variants consisted of 80% of all constructions, and of all constructions, more than 50% of each were structured with the verb 'give.' Lastly, DO type constructions were relatively more prone to be repeated by the same learner; however, PD type constructions had a wider dispersion range.

In general, dative alternation studies in learner languages are limited to investigating a set of selected verbs presumably frequent in dative construction in native speaker data. However, this approach might be incomplete and

misleading since studies tend to generalize findings for these selected verbs to the overall usage of the construction. Although the results pertain only to the findings of selected verbs, for instance (Babanoğlu, 2011; Jäschke, 2016; Song and Sung, 2017), prepositional object constructions were stated to be overused in learner data. Nonetheless, the correct interpretation indicates the overuse of prepositional object construction regarding only the verbs investigated in these studies, not the overuse of the construction in the given corpus.

In the current study, parameters were drawn for normally distributed data with normal priors and learner languages as random effect variables, that is, each subcorpus as a sampling source representing different groups for learners with a shared category of interest. The results showed that despite individual variations in probabilities across subcorpora, the difference was not significant, and most learners commonly primed the use of DO constructions.

Studies such as Szmrecsanyi et al. (2017) and Jenset (2018) have already revealed that constructional variation is influenced by several additional variables, including context, gender, and dialect. These studies invalidate the conception of a true preference only based on verb sensitivity or another single contextual factor, which is a case also investigated further by Chambaz and Desaguiller (2016). To specify, dative constructions are sensitive to the referential status of verbal complements (given vs. new). Also, considering syntactic complexity or end-weight preferences, the longer constituents are placed latter, while shorter ones are preferably positioned in front. Likewise, double object variants are realized with longer recipients; however, prepositional object variants consist of longer themes. Moreover, different organizations were observed for other variables; definite constituents are placed before indefinite ones, and animate items tend to occur before inanimate ones (Bresnan et al., 2007; Bresnan & Ford, 2010).

Given this fact, including the additional agent variable and excluding verb semantic class in the current study may have altered results, yet the findings were consistent with previous studies. In the current study, human recipients favoured DO constructions, considering the weight of individual variables over the construction type, pronominal, nonhuman agents, and pronominal. On the other hand, pronominal, nonhuman themes and nonhuman, nonpronominal recipients were more likely in PD constructions. Similarly, Bresnan et al. (2004) and Jäschke (2016) also reported that nonhuman recipients favoured PD constructions and Jäschke (2016) observed a higher probability of DO constructions given that recipients are pronominal and the likelihood of PD constructions with pronominal themes. Nevertheless, both studies excluded variable theme animacy from their conclusions as it was estimated to be a nonsignificant factor in regression. On the contrary, in this study, given the %ROPE value, that is, the percentages of probabilities inside the null range, parameter values of the factor fall entirely outside the rope, and theme referential feature was a sig-

nificant factor in dative construction preferences. Furthermore, similar to both studies mentioned above, a higher probability of prepositional object datives was observed with longer recipients, while longer themes were more probable in DO constructions in the current dataset. As a result, there was a common structural use of dative constructions across learner corpora. In other words, like the dominance of the verb 'give' in both types of constructions, priming of similar types of variables also exist in learner data regardless of first language differences.

The L1 influence is controversial in the SLA/EFL environment and even more complicated in interlanguage grammar studies. However, some studies mentioned before are biased towards native language interference as a source of variation or discrepancies in L2 outputs. They are biased in the sense that despite the lack of clear evidence of L1 interference or influence, learners' inaccuracy, recursive use of similar patterns, or unauthentic uses were attributed to first language influence directly or indirectly. Indeed, the point of departure in one study was stated as "the influence of the disparity between English and Arabic" (Aljadani, 2018, p. 65), and in others, it was the existence or nonexistence of corresponding rules or categories in the target language (Montrul, 1997; Santoro, 2007; Cuypere et al., 2014; Szcześniak, 2017; Yang and Luo, 2017; Pongyoo, 2017; Zeybek, 2018). Nonetheless, Cuypere et al. (2014) and Pongyoo (2017) stated limited evidence favouring L1 interference and claimed that issues raised with dative alternation might be due to differences in learners' proficiency levels. Other studies resulted in the influence of the first language on the target language, or more precisely, the transfer of L1 rules or knowledge to L2.

Moreover, Jäschke (2016) suggested that learners whose native languages share similarities with English in terms of dative construction were the ones "who most successfully master the native-like distribution of the two dative variants" (p. 166) and further claimed that "learners of those languages which have a dative alternation like English are very successful in acquiring the English-like distribution of the two competing dative constructions" (p. 167). One note of caution here is required as Jäschke (2016) realized verb senses as random effects; in other words, verb senses were provided as grouping variable where the variation of interest was centred. The data in that study was grouped based on the semantic classes of verbs used in the constructions, not based on learners' first languages. Therefore, the observed difference in Jäschke's (2016) study may have been due to the different verb choices of learners but not due to differences in learners' first languages.

So far, these suggestions in the studies mentioned above are in favour of Bybee's claim that "the acquisition of the L2 pattern in all its details is hindered by the L1 pattern" (2008, p. 232). Studies also suggested that the frequent use of particular forms in L2 may be due to first language influence (Foley & Flynn, 2018) or learners' awareness or informed knowledge of L1

forms that would be appropriately transferred to L2 (Kellerman, 1989, as cited in Foley & Flynn, 2018). These views may explain the dominant use of the verb 'give' in dative constructions by learners in the current study; however, as acknowledged by Odlin (2018), it still bears more studies to observe the nature of the transfer and to what extent forms are transferred. Selective transfer of the lexis with high prototypicality effects is possible, yet it is not evident if it is the transfer of habitual uses, that is, transfer of meaning or the transfer of corresponding conceptual structures. The result of regression modelling in the current study supports Odlin's (2018) statement as differences in first languages were observed to have no significant effect on learners' priming of different types of dative constructions.

To conclude, in the case of this study, learners with different first languages presented similar probabilities of using the same dative variant, that is, double object construction. The result disagrees with arguments on first language influence suggested in other studies. Differences in learners' first language provided no difference at all in terms of English dative construction preferences and weight of influential factors. Regardless of the L1 variation, a common patterning was observed across learner data.

Limitations and Further Research

As stated before, the construction preference may be affected due to various reasons. Similarly, the lack of genre differentiation in the ICLE corpus was an added limitation for comparison since certain genres may prime the use of particular forms as in academic writing. Also, the data lacked verb variation, which restricted the investigation of verb sensitivity in regression analysis, and predominant priming of the verb 'give' yielded skewed distribution for verb preferences, hindering a more detailed analysis of first language transfer. However, the skewness itself may indicate learners' inability to use other verbs in dative constructions due to additional reasons. For instance, it might also be indicative of external factors and learner strategies such as discourse influence, avoidance of using alternative verbs, or lack of knowledge or awareness of the dative structures as grammatical units. The result also suggests, a further analysis with alternative data sources and research methods to investigate the topic for the generalizability of the findings.

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Faith Ünal Bozdağ

Probabilistische Analyse der englischen Dativkonstruktionen in akademischen Texten von EFL-Lernern

Zusammenfassung

Grammatikalische Muster in Texten der Lernenden gehören zu den am meisten untersuchten Themen im Bereich des Zweit-/Fremdsprachenerwerbs und erfahren dank Korpusstudien einen besonderen Aufschwung. Auch für englische Dativkonstruktionen gibt es eine umfangreiche Literatur, die das sprachliche Phänomen aus verschiedenen Perspektiven und mit unterschiedlichen theoretischen Grundlagen erklärt. Bis auf wenige Ausnahmen lag der Schwerpunkt des Interesses jedoch stets auf dem Vergleich von Lernerdaten mit Daten von Muttersprachlern, insbesondere im Hinblick auf die Häufigkeit der Verwendung in der Lernumgebung der Zweit-/Fremdsprache. Im Unterschied zu anderen Studien wurde in der vorliegenden Studie die englische Dativalternation in Lernerdaten unter einem probabilistischen Gesichtspunkt untersucht, wobei 27 Lernerkorpora von Lernenden mit unterschiedlichen L1 einer Analyse unterzogen wurden. Die Ergebnisse zeigten, dass die Unterschiede in den Muttersprachen der Lernenden einen geringen Zusatznutzen für die Variationen zwischen den Lernenden hatten. Darüber hinaus wurde eine ähnliche Tendenz wie bei dem Priming des Verbs „geben“ in Dativkonstruktionen für die anderen Variablen in der Konstruktion beobachtet.

Schlüsselwörter: englische Dativkonstruktionen, Lernerkorpora, Interimssprache, Bayes’sche Regression, Einfluss der Erstsprache